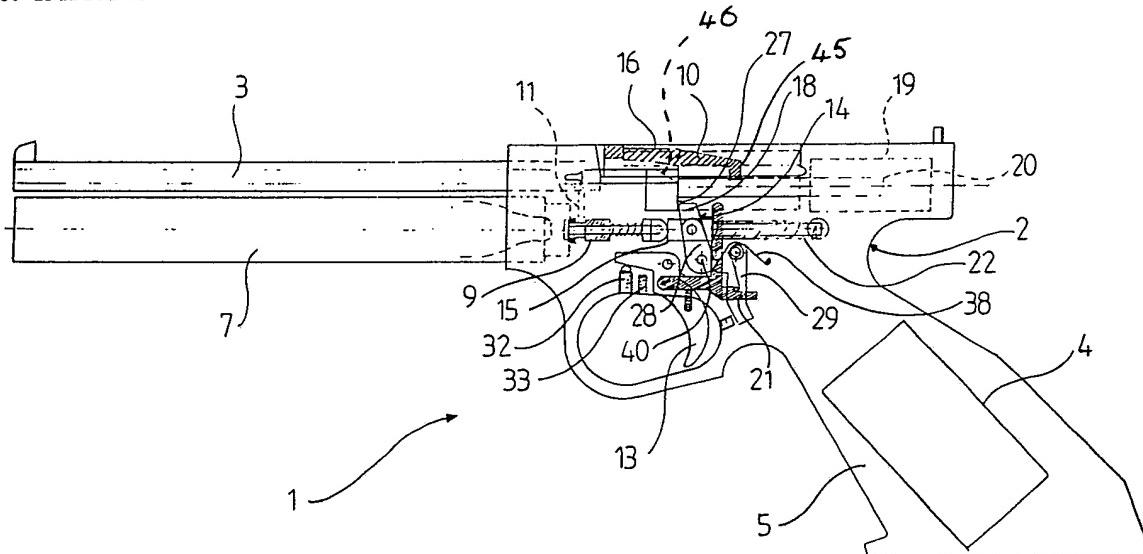




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(71)(72) Applicant and Inventor: KALOUSEK, Frank [AU/ AU]; 16 Kuringgai Crescent, Noble Park, VIC 3174 (AU).		Published <i>With international search report.</i>	
(74) Agents: SMEETON, Anthony, R. et al.; Davies & Collison, 1 Little Collins Street, Melbourne, VIC 3000 (AU).			

(54) Title: IMPROVED GUN



**(57) Abstract**

A gun (1) comprising a barrel (3), a trigger (13), and valve means (9) operatively connectible to a gas source (7) and operable so that when it is open a charge of gas can be delivered to the barrel (3) and, when it is closed, gas is inhibited from delivery to the barrel. The gun is characterized by actuating means (15) which is movable between a cocked position and an actuating position so that in the actuating position it can cause the valve means (9) to open, the actuating means (15) being movable into the actuating position from the cocked position by operation of the trigger (13). Electromagnetic means (19) is provided which is operatively connected to the actuating means (15) and operable so as to be capable of adopting either an activated state or a de-activated state such that in the activated state the electromagnetic means (14) causes the actuating means to move from the actuating position to the cocked position. In another aspect of the invention the gun comprises a magazine (16) having a pivotally mounted feed lever (10) for feeding projectiles into the barrel the lever being responsive to movement of the barrel closure (17) or activating means (15).

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"IMPROVED GUN"

This invention relates generally to gas or air guns and, more particularly though not exclusively, to gas powered guns of the repeater type.

5 It is an object of the present invention to provide an improved gun which is of relatively simple construction and economical in manufacture.

According to one aspect of the present invention there is provided a gun comprising  
10 a barrel, a trigger, valve means operatively connectible to a gas source and operable so that when it is open a charge of gas can be delivered to the barrel and, when it is closed, gas is inhibited from delivery to the barrel,  
15 the gun being characterized by actuating means movable between a cocked position and an actuating position so that in the actuating position it can cause the valve means to open, the actuating means being movable into the actuating position  
20 from the cocked position by operation of the trigger, electromagnetic means operatively connected to the actuating means and operable so as to be capable of adopting either an activated state or a de-activated state such that in the activated  
25 state the electromagnetic means causes the actuating

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means to move from the actuating position to the cocked position.

Preferably, the valve means is normally closed and is arranged so that when the actuating 5 means returns from the actuating position to the cocked position, the valve means will close.

Preferably the valve means is biased by means of a spring or the like so as to be closed.

Preferably the actuating means is normally 10 biased for movement from the cocked position to the actuating position and this may be effected by means of a spring or like device. The spring is preferably adjustable so that the force with which it strikes the valve can be varied. By 15 this arrangement the size of the charge of gas delivered to the barrel can be selectively varied. The gun may further include releasable holding means for retaining the actuating means in the cocked position the retaining means being releasable 20 by operation of the trigger. In a preferred form the actuating means comprises a plunger which is movable so that in the actuating position it engages the valve means.

The gun may further include a barrel closure 25 which is movable between open and closed positions such that, in the open position, a projectile can be located within the barrel. Preferably the barrel closure is normally closed when a charge of gas is delivered to the barrel to 30 fire the projectile. The barrel closure may be operatively connected to the electromagnetic means so that, when it is in the activated state, the barrel closure is moved from its closed to its open position and upon de-activation 35 thereof is arranged to return to its closed position. In one preferred form the electromagnetic

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means comprises a solenoid operatively connected to a power source. Preferably the barrel closure is biased for movement between the open position to the closed position by means of a spring or like member. The barrel closure may take any suitable form and in one arrangement comprises a plunger which is movable to close one end of the barrel.

The gun may further include coupling means operatively interconnecting the barrel closure and the actuating means the coupling means being such that when the electromagnate means is in the activated state the barrel closure is caused to move from the closed position to the open position and the actuating means is caused to move from the released position to the cocked position and when the electromagnetic means is in the de-activated state the barrel closure can move to the closed position while the activating means remains in the cocked position being held by the retaining means.

The solenoid may include a movable core which is operatively connected to the barrel closure member. The coupling means may in one form comprise a coupling member operatively connected to the solenoid and is secured to the barrel closure member at one part thereof with another part of the coupling member slidably mounted in a slot in the actuating means. The slot may have a shoulder at one end, the arrangement being such that when the solenoid is in its activated state the core is moved so that it moves the closure member to its open position, and with this movement the coupling part associated with the slot in the actuating means engages the shoulder thereon so as to cause the actuating

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means to move into its cocked position wherein it is held by the retaining means. When the solenoid is de-activated the closure member returns to its closed position preferably under 5 the action of a spring. The relative movement between the closure member and the actuating means is as a result of the coupling element being able to move along the slot therein.

In another preferred form the coupling 10 means comprises a lever pivotally secured to the actuating means and being adapted to engage a shoulder on the barrel closure such that when the electromagnetic means is in said activated state the barrel closure is caused to move from 15 the closed to the open position and as a result of engagement of the pivotal lever by the shoulder the activating means via the pivotal movement of the lever moves from the release position to the cocked position. When the electromagnetic 20 means is in the de-activated state the barrel closure can move to the closed position while the activating means remains in the cocked position.

Preferably a gas supply container is provided having the gas source therein the container 25 being mounted on the gun.

A control linkage may be provided for operatively connecting the trigger to the actuating means. Preferably the control linkage includes as part thereof the retaining means. The control means 30 is arranged so that operation of the trigger causes the retaining means to disengage from the actuating means to enable it to move from the cocked position to the actuating position.

In one form the control linkage comprises 35 an elongated disconnector link having one end connected to the trigger, a first sear and a

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second sear. The disconnector link is connected at its other end to the second sear which in turn is operable to retain the first sear in a position whereby it can retain the actuating means in its cocked position.

According to another aspect of the present invention there is provided a gun comprising a barrel, a trigger, valve means operatively connectible to a gas source and operable so that when it is open a charge of gas can be delivered to the barrel and, when it is closed, gas is inhibited from delivery to the barrel, the gun being characterized by actuating means movable between a cocked position and an actuating position so that in the actuating position it can cause the valve means to open, the actuating means being movable into the actuating position from the cocked position by operation of the trigger, a magazine operatively mountable to the gun and being adapted to hold a plurality of projectiles therein, the magazine including a feed lever which is mounted for pivotal movement between a feed position and non-feeding position said feed lever being movable into said feed position in response to said actuating means being moved from said actuating position to said cocked position.

Preferably the gun further includes a barrel closure which is movable between open and closed positions such that in the open position a projectile can be located within the barrel, the barrel closure being normally closed when a charge of gas is delivered to the barrel to fire the projector. The magazine may further include a follower thereon which is adapted to engage a cam surface on the barrel closure to cause

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movement of the feed lever from its non-feed to the feed position.

It will be appreciated that the magazine described above is particularly suitable for  
5 use with the gun according to the first aspect of the present invention.

Preferred embodiments of the invention will hereinafter be described with reference to the accompanying drawings in which:

10 FIG. 1 is a schematic side elevation of a gun according to one embodiment of the present invention with the barrel closure closed and the actuating means released;

15 FIG. 2 is a similar view as FIG. 1 with the barrel closure open and the actuating means cocked; and

FIG. 3 is a similar view to FIG. 2 of a further embodiment of the present invention.

20 In the drawings, where possible, like numerals have been used in the description to identify the various parts which are the same or equivalent in the two embodiments.

25 Referring to the drawing there is shown a gun generally indicated at 1 which as shown is in the form of a pistol comprising a main body 2 having a handle 5 and a barrel 3. A gas container 7 is disposed below the barrel 3 and gas is arranged to be discharged into the barrel through valve 9 and delivery passage 30 11 by depression of trigger 13.

35 Actuating means 15 which, as shown, is in the form of a plunger is movable between a cocked position (FIGS. 2 and 3) to an actuating position in which it engages the valve 9 to open that valve. The actuating means is spring biased by spring 22 as shown in Figs 1 and 2

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but not shown in Fig 3 towards the valve and the spring biasing pressure is adjustable by a suitable means (not shown).

The gun further includes a projectile housing or magazine 16 which is adapted to hold a plurality of projectiles 30 which can be fed to the barrel in sequence.

As shown in Figs 1 and 2, a pivotally mounted lever 10 is associated with the magazine for forcing projectiles into the barrel 3. A barrel closure 17 is arranged for movement between an open position in which a projectile 30 is adapted to be fed to the barrel 3 from the projectile housing or magazine 16 and a closed position in which position the gun is ready to be fired. Both the barrel closure 17 and the actuating means 15 are operatively connected to a solenoid 19 so that when the solenoid is in an activated state, the barrel closure and the actuator are moved into their open position and cocked positions respectively.

As referred to above, there is provided a magazine 16 for holding projectiles 30 and that magazine includes a pivotally mounted lever 10 which is adapted to urge the projectiles into the barrel 3 one at a time. The magazine includes a projectile holding tube which carries the projectiles one behind the other and has an open end adjacent the feed lever 10. The projectiles are biased by a suitable spring and or plunger device to urge them towards the open end. The feed lever 10 includes a follower 45 at the other end thereof which is adapted to engage a cam surface 46 on the barrel closure 17 thereby causing pivotal movement of the feed lever 10 between a feed position (Figure 2)

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and a non-feed position (Figure 1).

The solenoid is powered by a battery 4 in the handle of the gun. The barrel closure 17 is arranged so that when the solenoid is 5 de-activated, it can return to the closed position. As can be seen, the barrel closure 17 and the actuating means 15 are operatively interconnected by coupling means 14. The coupling means 14 enables both elements to be drawn back together 10 (that is to the right as shown in the drawings) and permits the barrel closure 17 to move into its closed position by movement relative to the actuating means 15 while the activating means is retained in the cocked position.

15 In the embodiment of Figures 1 and 2 the coupling means 14 comprises a lever 18 pivotally mounted to the head of the actuating plunger 15. The free end of the lever 18 is adapted to engage a shoulder 27 on the barrel closure 20 17. The lever 18 is arranged for pivotal movement about pivot pin 40. The barrel closure 17 is connected to the core 20 of solenoid 19. It will thus be appreciated that when the barrel closure 17 is drawn from the closed position 25 to the open position by activation of solenoid 19 the free end of the lever 18 will engage the shoulder 27 and be pivoted about the pivot pin 40 such that the actuating member 15 will be drawn towards its cocked position. Furthermore, 30 because of the arrangement of the shoulder 27, and the lever 18, when the barrel closure returns the closed position, the lever 18 is not influenced by this movement and thus the actuating means 15 can be held in the cocked position.

35 In the embodiment of Figure 3, the coupling means 14 comprises a rod or bar 34 which is

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connected at one end to the barrel closure 17 and the other end is disposed within a slot 12 in the actuating means 15. A shoulder 37 is provided at one of the slot 12 so that when 5 the barrel closure 17 is moved from the closed to open positions the rod or bar 34 engages the shoulder 37 and thereby causes the actuating means 15 to move away from the valve 9 towards its cocked position. Again it will be seen 10 that when the closure member 17 returns to the closed position the coupling rod or bar 34 simply travels along the slot 12 and has no influence on the movement of the actuating means 15.

The actuating means 15 is held in its cocked 15 position by means of retaining means. In the embodiment of Figures 1 and 2, the retaining means comprises a first sear 28 which forms part of the lever 18 referred to above and a second sear 29 which is operable to engage the 20 first sear to retain the actuating means 15 in the cocked position. The second sear 29 is influenced by spring 38. A disconnector link 21 operatively connects the trigger 13 to the second sear 29.

25 In the form shown in Figure 3 retaining means comprises an upper sear 23, a lower sear 25 and a disconnector link 21 which is operatively connected to the trigger 13. The trigger 13 may be provided with a trigger pressure spring 32 and top screw 33.

Having now described the various component parts of preferred forms of the gun according to the invention the operation will hereinafter be described. As shown in Figs 2 and 3 of the 35 drawings, the actuating means 15 is in the cocked

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position and is retained in that position by interengagement of first and second sears 28 and 29 in Figs 1 and 2 and upper and lower sears 23 and 25 in Fig 3. In this position, the solenoid 19 is de-activated and the barrel closure 17 is urged into the closed position by means of a spring (not shown). The valve 9 is closed so that gas cannot be delivered to the barrel. When the trigger 3 is operated, the disconnector 21 is moved rearwardly so that the sears clear each other thereby enabling the actuating means 15 under the action of spring 22 in Figs 1 and 2 is moved to a position where it engages the valve 9 thereby opening the valve so that a charge of gas is delivered to the barrel to fire the projectile. Preferably contacts are provided on the valve head so that when the actuating means 15 engages the valve head the contacts are closed so as to cause the solenoid 19 to adopt its activated state. In this state, the core 20 thereof pulls the activating means 15 and the barrel closure 17 to the right so that the actuating means will move into its cocked position and be retained by relocation of the sears to prevent its return to the actuating position.

In turn, the barrel closure 17 is drawn to the right so that it is open thereby permitting a further projectile to be fed from the container or magazine 16 into the barrel. The solenoid in this position adopts its de-activated state and a spring (not shown) causes the barrel closure 17 to return to its closed state whereby the firing action can be repeated.

Finally, it is to be understood that various

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alterations, modification and/or additions may  
be incorporated into the various constructions  
and arrangements of parts without departing  
from the spirit and ambit of the invention.

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CLAIMS:

1. A gun (1) comprising a barrel (3), a trigger (13), valve means (9) operatively connectible to a gas source (7) and operable so that when it is open a charge of gas can be delivered to the barrel (3) and, when it is closed, gas is inhibited from delivery to the barrel, the gun being characterized by actuating means (15) movable between a cocked position and an actuating position so that in the actuating position it can cause the valve means (9) to open, the actuating means (15) being movable into the actuating position from the cocked position by operation of the trigger (13), electromagnetic means (19) operatively connected to the actuating means (15) and operable so as to be capable of adopting either an activated state or a de-activated state such that in the activated state the electromagnetic means (14) causes the actuating means to move from the actuating position to the cocked position.
2. A gun according to claim 1 further including a barrel closure (17) which is movable between open and closed positions such that, in the open position, a projectile can be located within the barrel (3), the barrel closure (17) being normally closed when a charge of gas is delivered to the barrel to fire the projectile, said barrel closure (7) being operatively connected to the electromagnetic means (9) so that when it is in the activated state the barrel closure (17) is moved from its closed to its open position and upon de-activation thereof is arranged to return to its closed position.
3. A gun according to claim 1 or claim 2 electromagnetic means (19) includes a solenoid operatively connected to a power source (4).

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4. A gun according to claim 2 or 3 comprising coupling means (14) operatively interconnecting said barrel closure (17) and said actuating means (15) said coupling means (14) being such that when said electromagnetic means is in said activated state said barrel closure (17) is caused to move from said closed position to said open position and said actuating means (15) is caused to move from said released position to said cocked position and when said electromagnetic means is in said de-activated state said barrel closure (17) can move to said closed position while said activating means (15) remains in said cocked position.

5. A gun according to claim 4 wherein said solenoid (19) comprises a movable core (20) which is operatively connected to the barrel closure member (17), said coupling means comprising a coupling member (34) operatively connected to said solenoid (20) and with one part thereof being secured to the barrel closure member (17) and with another part thereof being slidably mounted in a slot (12) on the actuating means (15) the slot (12) having a shoulder (37) at one end, the arrangement being such that when the solenoid is in its activated state the core is moved so that it moves the closure member into its open position, and during this movement the coupling part associated with the slot in the actuating means engages the shoulder therein so as to cause the actuating means to move into its cocked position wherein it is held by the retaining means, and when the solenoid is de-activated the closure member is caused to return to said closed position the relative movement between it and the actuating means being as a result

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of the coupling element being able to move in the slot therein.

6. A gun according to claim 4 wherein said coupling means comprises a lever (18) pivotally secured to said actuating means (15) and being adapted to engage a shoulder (27) on said barrel closure (17) such that when said electromagnetic means is in said activated state said barrel closure (17) is caused to move from said closed to said open position and during said movement said pivotal lever (18) engages said shoulder (27) such that said activating means (15) is caused to move from said release position to said cocked position and when said electromagnetic means is in said de-activated state said barrel closure (17) can move to said closed position while said activating means (15) remains in said cocked position.

7. A gun according to any preceding claim including a gas supply container (7) having the gas source therein said container being mounted on the gun.

8. A gun according to any preceding claim wherein said valve means (9) is normally closed and is arranged so that when said actuating means (15) returns from the actuating position to the cocked position, the valve means (9) will close, said valve means (9) being biased so as to be normally closed.

9. A gun according to any preceding claim wherein said actuating means (15) is normally biased for movement from the cocked position to the actuating position.

10. A gun according to any preceding claim further including releasable retaining means for retaining the actuating means in the cocked

-15-

position the retaining means being releasable by operation of the trigger (13).

11. A gun according to any preceding claim wherein said actuating means (15) comprises a plunger which is movable so that in the actuating position it engages the valve means (9).

12. A gun according to claim 1 or claim 2 further including a magazine (16) operatively mountable to the gun and being adapted to hold a plurality of projectiles therein, the magazine including a feed lever (10) which is mounted for pivotal movement between a feed position and non-feeding position said feed lever being movable into said feed position in response to said actuating means being moved from said actuating position to said cocked position.

13. A gun according to claim 12 wherein said feed lever (10) includes a follower (45) thereon which is adapted to engage a cam surface (46) on the barrel closure (17) to cause movement of the feed lever from its non-feed to the feed position.

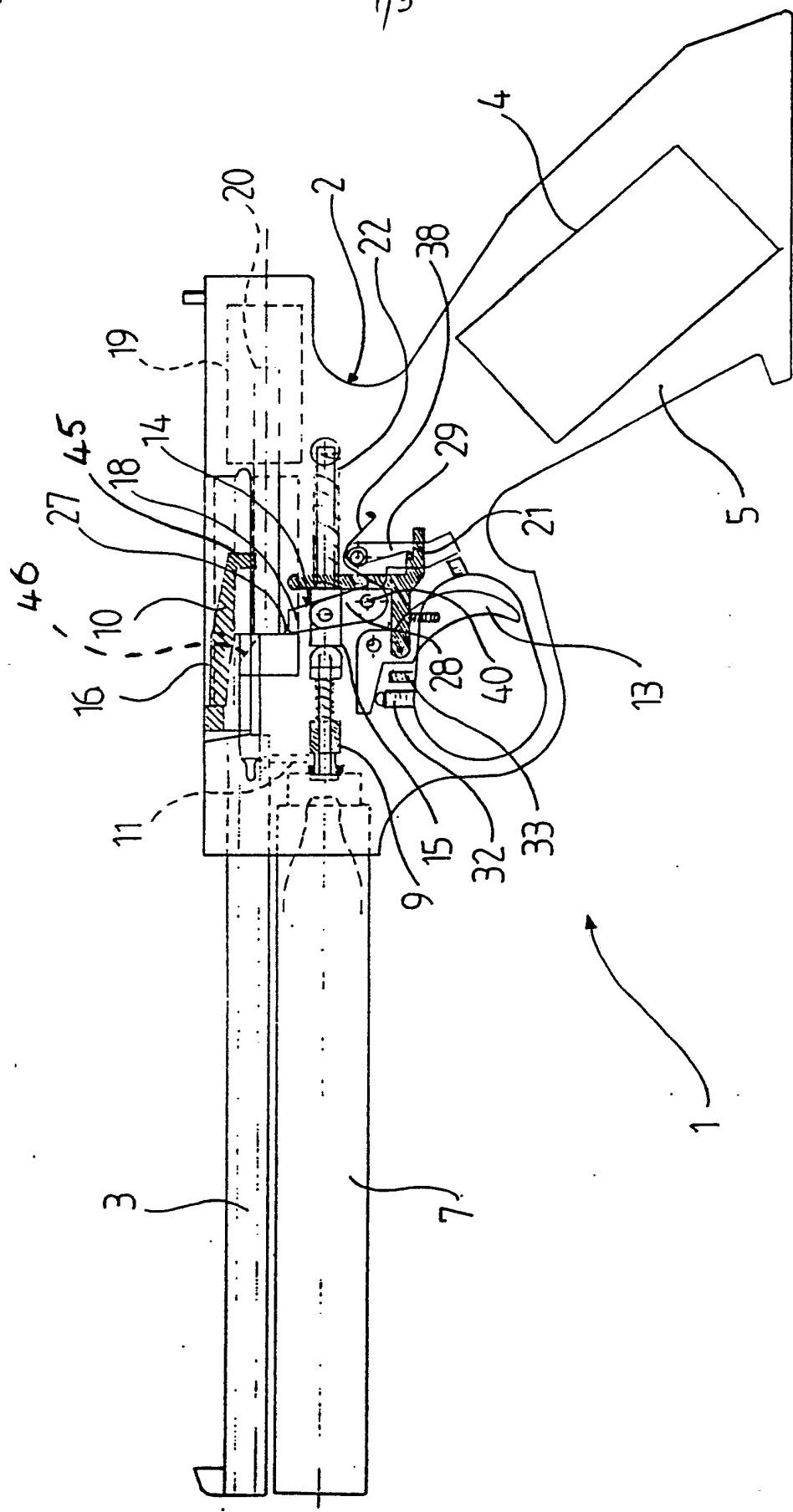
14. A gun (1) comprising a barrel (3), a trigger (13), valve means (9) operatively connectible to a gas source (7) and operable so that when it is open a charge of gas can be delivered to the barrel (3) and, when it is closed, gas is inhibited from delivery to the barrel, the gun being characterized by actuating means (15) movable between a cocked position and an actuating position so that in the actuating position it can cause the valve means (9) to open, the actuating means (15) being movable into the actuating position from the cocked position by operation of the trigger (13), a magazine (16) operatively mountable to the gun and being adapted to hold

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a plurality of projectiles therein, the magazine including a feed lever (10) which is mounted for pivotal movement between a feed position and non-feeding position said feed lever being movable into said feed position in response to said actuating means being moved from said actuating position to said cocked position.

15. A gun according to claim 14 further including a barrel closure (17) which is movable between open and closed positions such that, in the open position, a projectile can be located within the barrel (3), the barrel closure (17) being normally closed when a charge of gas is delivered to the barrel to fire the projectile, and wherein said feed lever (10) comprises a follower (45) thereon which is adapted to engage a cam surface (46) on the barrel closure (17) to cause movement of the feed lever from its non-feed to the feed position.

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FIG-1

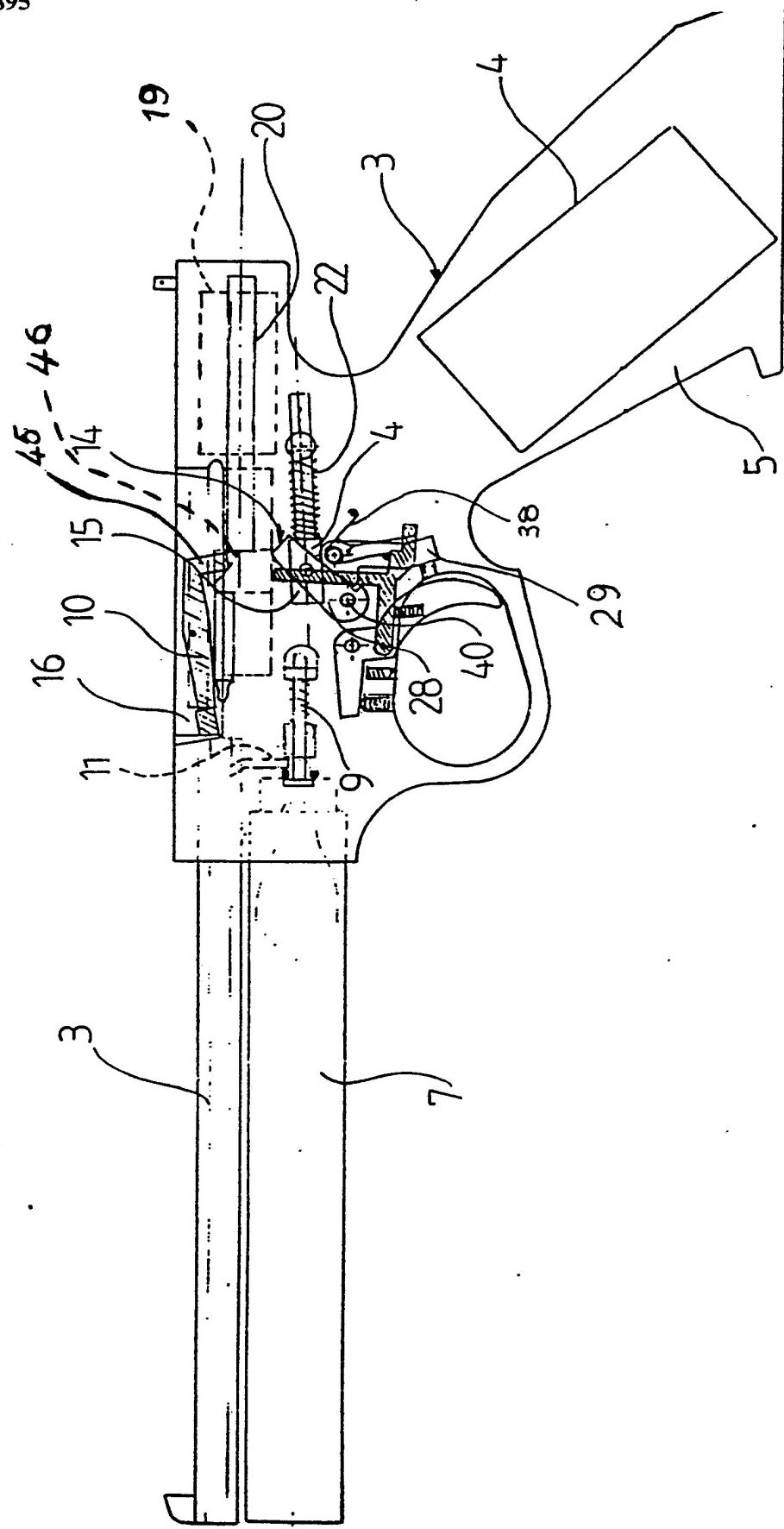


FIG-2

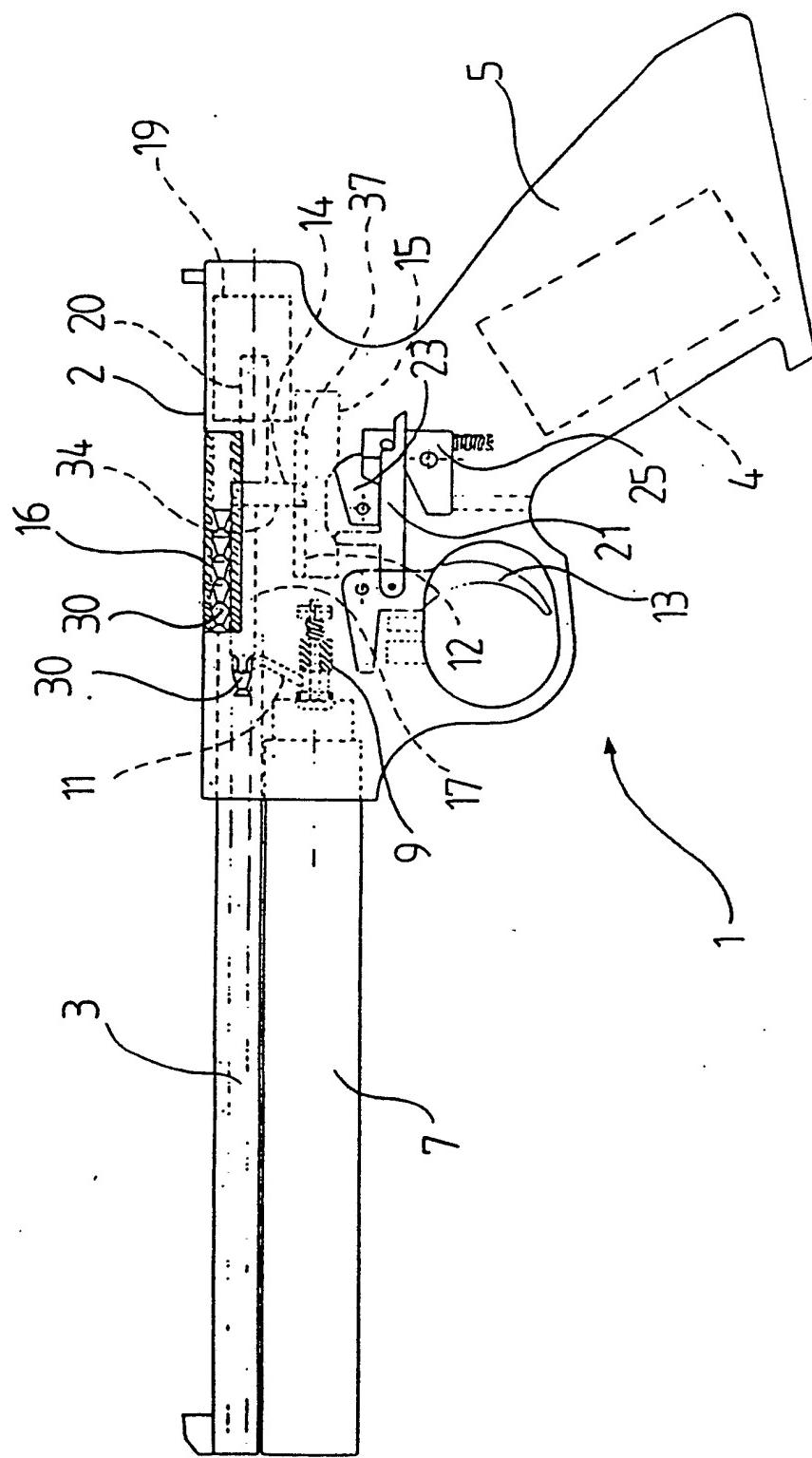


FIG-3

# INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00031

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.<sup>4</sup> F41B 11/02, 11/06

## II. FIELDS SEARCHED

Minimum Documentation Searched \*

Classification System	Classification Symbols
IPC	F41B 11/02, 11/06, 11/00

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

AU : IPC as above

## III. DOCUMENTS CONSIDERED TO BE RELEVANT \*

Category \*<sup>1</sup> Citation of Document,<sup>11</sup> with indication, where appropriate, of the relevant passages<sup>12</sup> | Relevant to Claim No.<sup>13</sup>

- |   |  |         |
|---|--|---------|
| X | US,A, 3048159 (KLINE et al) 7 August 1962 (07.08.62) | (14,15) |
| A | US,A, 2554116 (MONNER) 22 May 1951 (22.05.51)        |         |
| A | DE,A, 3521800 (IDL) 25 September 1986 (25.09.86)     |         |

- \* Special categories of cited documents:<sup>10</sup>
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- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "Z" document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search

11 May 1988 (11.05.88)

Date of Mailing of this International Search Report

19 MAY 1988

International Searching Authority

Australian Patent Office

Signature of Authorized Officer

E.N. PERRIS

